

THE CLAIMS

We claim:

1. A sensor for performing surface enhanced Raman spectroscopy, comprising:
 - a sensor body having a throughbore;
 - an optical energy source for generating an optical excitation signal;
 - a surface enhanced Raman scattering structure that is mounted to said sensor body through which said optical excitation signal is directed for irradiating an analyte, whereupon said analyte generates primary Raman emissions in response to being irradiated by said optical excitation signal, and wherein said surface enhanced Raman scattering structure generates secondary Raman emissions when irradiated by said optical excitation signal;
 - an optical detector for generating an output signal that represents the spectral characteristics of said primary and secondary Raman emissions in response to receiving said primary and secondary Raman emissions; and
 - a processor for substantially filtering said secondary Raman emission from said primary Raman

18 emissions and for generating an output signal representing said analyte.

1 2. The sensor of claim 1 which further includes a first optical fiber for directing said optical
2 excitation signal through said SERS structure.

1 3. The sensor of claim 2 which further includes a bandpass filter for attenuating any self excited
2 Raman emissions that may be stimulated by said optical excitation signal in said first optical
3 fiber.

4 4. The sensor of claim 1 further including a second optical fiber for directing said primary and
5 secondary Raman emissions to said optical detector.

6 5. The sensor of claim 1 further including a long pass filter for filtering optical signals having
7 wavelengths less than a predetermined wavelength.

1 6. The sensor of claim 1 further including a display for presenting human readable indicia
2 representing said analyte.

1 7. A sensor for performing surface enhanced Raman spectroscopy, comprising:
2

3 a sensor body;
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5 an optical energy source for generating an optical excitation signal;
6
7 a surface enhanced Raman scattering structure that is mounted to said sensor body through which
8 said optical excitation signal is directed for irradiating an analyte, whereupon said analyte
9 generates primary Raman emissions in response to being irradiated by said optical excitation
10 signal, and wherein said surface enhanced Raman scattering structure generates secondary
11 Raman emissions when irradiated by said optical excitation signal;
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13 an optical detector for generating an output signal that represents spectral characteristics of said
14 primary and secondary Raman emissions in response to receiving said primary and second
15 Raman emissions; and
16
17 a processor for creating a sample file that represents said spectral characteristics of said primary
18 and secondary Raman emissions, a reference file that represents said secondary Raman
19 emissions, and a data file that represents the difference between said sample file and said
20 reference file, and for generating an output signal that represents said analyte where said analyte
21 has spectral characteristics represented by said data file.

1 8. A method for identifying an analyte using Raman spectroscopy, comprising the steps of:

2
3 generating an excitation light signal;

4
5 directing said excitation light signal through a SERS structure that is in contact with an analyte
6 so that said analyte generates primary Raman spectral emissions when irradiated by said optical
7 excitation signal, and wherein said SERS structure generates secondary Raman spectral
8 emissions in response to being irradiated by said excitation light signal;

9
10 generating an output signal representing said first and second Raman spectral emissions in
11 response to detecting said first and second Raman spectral emissions;

12
13 substantially filtering said secondary Raman emission from said primary Raman emissions to
14 create a data file;

15
16 identifying one or more candidate analytes characterized by said primary Raman emissions from
17 said data file; and

18
19 generating an output signal that represents said candidate analytes.